

What is claimed is:

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a1* 1. A method of making reinforced paperboard cartons comprising the steps of:

(a) advancing a web of paperboard along a path, the web of paperboard having a width;

(b) progressively applying at least one ribbon of reinforcing material to the advancing web of paperboard to form a reinforced region, the ribbon having a width less than the width of the web of paperboard and an edge;

(c) scoring fold lines in the web of paperboard, at least one of the fold lines crossing the edge of the ribbon of reinforcing material to define a fold line having a first section within the reinforced region and a second section outside the reinforced region, the first section of the fold line being wider than the second section of the fold line; and

(e) forming a transition zone between the first and second sections of the fold line.

2. The method of claim 1 and where in step (e) the transition zone comprises a widening of the fold line from the narrower second section of the fold line to the wider first section of the fold line.

3. The method of claim 2 and where in step (e) the fold line widens smoothly from the second to the first sections of the fold line.

4. The method of claim 2 and wherein the edge of the reinforcing ribbon is located within the transition zone nearer the wider portion of the fold line.

5. The method of claim 1 and wherein step (c) further comprises impressing the paperboard with a multi-point scoring rule having a narrower section outside the reinforced region and a wider section inside the reinforced region.

6. The method of claim 5 and wherein the scoring rule is part of a platen die cutter.

7. The method of claim 5 and wherein the scoring rule is part of an in-line rotary die cutter.

8. The method of claim 5 and wherein step (c) further comprises locating a counter plate beneath the scoring rule, the counter plate being formed with a groove aligned with the scoring rule, the groove having a narrower section aligned with the narrower section of the scoring rule and a wider section aligned with the wider section of the scoring rule.

9. The method of claim 8 and where in step (e) the transition zone is formed by gradually widening the groove in the counter plate from its narrower section to its wider section.

10. The method of claim 9 and wherein the junction between the narrower and the wider sections of the scoring rule is aligned with the wider end of the transition zone.

Sub
a2 11. A method of scoring a fold line in a paperboard carton blank having a base sheet of paperboard and a reinforced region formed by a reinforcing ribbon laminated to the base sheet wherein the fold line transitions from outside the reinforced region to inside the reinforced region, the method comprising the steps of:

(a) providing a multi-point scoring rule having a narrower first section for scoring the portion of the fold line outside the reinforced region and a wider second section for scoring the portion of the fold line within the reinforced region; and

(b) impressing the paperboard carton blank with the multi-point scoring rule.

12. The method of claim 11 and where in step (b) the paperboard carton blank is sandwiched between the multi-point scoring rule and a counter plate, the counter plate formed with a groove aligned with the scoring rule with the groove having a narrower section aligned with the narrower section of the scoring rule and a wider section aligned with the wider section of the scoring rule.

13. The method of claim 12 and wherein the groove in the counter plate is further formed with a transition region between its narrower section and its wider section to form a fold line with a corresponding transition region at the edge of the reinforcing ribbon.

14. The method of claim 13 and wherein the transition region of the groove comprises a gradually widening section of the groove from its narrower section to its wider section.

15. The method of claim 14 and wherein the transition region of the groove is about .125 inches long.

16. A carton blank comprising:
a base sheet of paperboard material having a width;
at least one ribbon of reinforcing material having an edge a width less than the width of the base sheet, said ribbon of reinforcing material being laminated to the base sheet at a predetermined position thereon to form a reinforced region of the carton blank;

at least one fold line scored in the carton blank, said fold line crossing from a location within said reinforced region of said carton blank to a location outside said reinforced region.

17. A carton blank as claimed in claim 16 and wherein the fold line is relatively wider within said reinforced region of said carton blank and relatively narrower outside of said reinforced region.

18. A carton blank as claimed in claim 17 and wherein said fold line is formed with a transition zone between its relatively wider and its relatively narrower sections.

19. A carton blank as claimed in claim 18 and wherein said edge of said reinforcing ribbon crosses said fold line within said transition zone.

20. A carton blank as claimed in claim 19 and wherein said fold line widens within said transition zone from its relatively narrower section to its relatively wider section.

21. A carton blank as claimed in claim 20 and wherein said fold line widens gradually within said transition zone.

22. A carton blank as claimed in claim 20 and wherein said edge of said reinforcing ribbon is located nearer the wider portion of said transition zone.

23. A carton blank as claimed in claim 18 and wherein said transition zone is about .125 inches long.

24. A scoring rule assembly for use in a die cutter for scoring multi-width fold lines in carton blanks, said scoring rule comprising:

a first section formed by a scoring blade having a first thickness; and

a second section formed by a scoring blade having a second thickness greater than said first thickness.

25. A scoring rule assembly as claimed in claim 24 and wherein said first section and said second section meet at a joint.

26. A scoring rule assembly as claimed in claim 25 and wherein the joint is a butt joint.

27. A scoring rule assembly as claimed in claim 24 and further comprising a platen die cutter having a head, said scoring rule being disposed in said head of said platen die cutter.

28. A scoring rule assembly as claimed in claim 24 and further comprising an in-line rotary die cutter having a drum, said scoring rule being disposed in said drum of said in-line rotary die cutter.

29. A scoring rule assembly as claimed in claim 24 and further comprising a counter plate against which said scoring rule is impressed to score fold lines in carton blanks, said counter plate being formed with at least one groove aligned with said scoring rule, said groove having a relatively narrower section aligned with said first section of said scoring rule and a relatively wider section aligned with said second section of said scoring rule.

30. A scoring rule assembly as claimed in claim 29 and wherein said groove is formed with a transition region aligned with the junction of said first and second sections of said scoring rule.

31. A scoring rule assembly as claimed in claim 30 wherein said groove gradually widens from its relatively narrower section to its relatively wider section to define said transition zone.

32. A scoring rule assembly as claimed in claim 31 and wherein said junction of said first and second section of said scoring rule is aligned substantially with the wider end of said transition zone.

Sub a 3 33. A method of making reinforced paperboard carton blanks comprising the steps of:

(a) advancing a web of paperboard along a path, the web of paperboard having a width;

(b) advancing at least one ribbon of reinforcing material along a path, said reinforcing material having a width less than the width of said web of paperboard;

(c) progressively deforming the ribbon of reinforcing material; and

(d) progressively laminating the deformed ribbon of reinforcing material to the web of paperboard to form a reinforced paperboard carton blank.

34. The method of claim 33 and wherein step (c) comprises passing the ribbon of reinforcing material between a pair of impression cylinders.

35. The method of claim 34 and wherein the surfaces of said impression cylinders are configured to form an array of perforations in said ribbon of reinforcing material.

36. The method of claim 34 and wherein the surfaces of said impression cylinders are configured to form longitudinal flutes in said ribbon of reinforcing material.

37. The method of claim 34 and wherein the surfaces of said impression cylinders are configured to form transverse corrugations in said ribbon of reinforcing material.

38. A ribbon reinforced carton blank comprising a base sheet of paperboard having a width, at least one ribbon of reinforcing material having a width less than the width of said base sheet and being laminated to said base sheet at a selected location thereon, said ribbon of reinforcing material being deformed.

39. A ribbon reinforced carton blank as claimed in claim 38 and wherein said ribbon of reinforcing material is deformed so as to exhibit an array of perforations.

40. A ribbon reinforced carton blank as claimed in claim 38 and wherein said ribbon of reinforcing material is deformed so as to exhibit longitudinal flutes.

41. A ribbon reinforced carton blank as claimed in claim 38 and wherein said ribbon of reinforcing material is deformed so as to exhibit transverse corrugations.